This darter is abundant in some of the foothill streams near Boulder, Colorado. Males in full breeding colors, with milt flowing freely when touched, and females with mature ova which could be discharged with slight pressure, were found as early as April 22 and as late as June 1, in Dry Creek, a small stream a few miles east of Boulder. These breeding fish were taken in water from three to four feet deep. The temperature of the water varied from 12°C. to 15°C., and its alkalinity equaled a 1-800 normal solution of Potassium Hydroxid. The darters were especially fond of pools where the bottom of the stream was covered with a heavy slime and masses of rotting vegetation, which had to be removed before the fish could be captured. When disturbed, the darters, which could be seen resting on top of this slime, burrowed into the soft debris by a series of quick movements of the pectortal and ventral fins. This preference for the deep pools at this time seemed to be correlated with the breeding activities of this species, as *Etheostoma iowae* was found usually under pebbles in swiftly running water and in shallow riffles during the fall, winter and early spring.

The incubation period of the eggs of *Etheostoma iowae* kept in running water at 13°C. to 16°C. in the laboratory, was comparatively short, occupying from 18 to 26 days. The germ ring was clearly visible by the twentieth hour after fertilization, and the majority of the eggs of one large series hatched within 30 minutes of each other on the twenty-fourth day. The newly-hatched darter was 3.4 millimeters in length.

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THE BREEDING HABITS OF THE VIVIPARUS PERCH, CYMATOGASTER.

The family Embiotocidae includes a number of interesting percoid fishes. They have all developed

viviparity to a high degree of perfection, the young being born in an almost adult condition. Very little has been written of their habits, and apparently nothing at all of their copulation. So it was with much satifsaction that I observed, under very favorable circumstances, the breeding habits of *Cymatogaster aggregatus*. The date of the observation was July 5, 1916; the locality was in the shallow channel forming the outlet and inlet of an estero near Goleta in Santa Barbara County, California.

Attention was first directed to a slight disturbance about twenty feet offshore, where two "Shiners" were swimming with their backs just out of the water. Very soon the pair were joined by about 6 others, which, judging from their small size, were likely males. The original pair swam slowly towards shore, their caudal regions in close proximity. The largest of the supernumerary fishes immediately preceded the pair, while the others followed a short distance behind. Occasionally the male turned partly over onto his side. After the fishes had proceeded thus shoreward about 6 feet, there ensued a commotion, of which the details were not observed, and then all but the first pair swiftly made for deeper water offshore.

The pair, now alone, then proceeded against the tide in a semi-circular course of about five feet, frequently pausing while the male, turning upon his side, applied his anal region to that of his mate. Finally reaching the shelter of a stone in about a foot of water, the pair halted and copulation ensued. With their heads in the same direction and their anal regions in contact, the pair remained quite motionless for a few seconds, seeming to balance in the water. The male then turned over to a nearly horizontal position, the female much less. For several seconds the male moved rather slowly about half an inch back and forth, paused, then resumed the vibratory move-

ment for a few seconds, and finally darted off, without warning into deeper water.

The female remained quite motionless in the shelter of the stone, and was readily captured in a seine. Its oviduct was loosely extruded for about 5 mm., and from it there projected the tail of the single remaining young. This young fish was about of the same size as numerous others seined nearby, most abundantly over the bottom where strewn by kelp washed in by the tide.

This observation confirms other evidence that the period between copulation and the bearing of the young is one year.

The life color of this breeding female may be of interest. The gold color appears in the usual two bars across the middle of the brilliantly silver sides, which are tinged with gold posteriorly; there is also a smaller bar before these, and a trace of one along the margin of the branchial aperture. There is a blotch before the pectoral fin, and another small blotch which is located behind and below the pectoral, and is followed by a streak extending nearly across the trunk.

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NOTES ON THREE COMMON NEW JERSEY TURTLES.

These notes are taken essentially word for word from my notebook.

Mating of Box Turtles and of Wood Turtles. I have twice found turtles apparently either mating or just after or about to begin mating, though on neither occasion could I see any connection other than that one was sitting squarely on the other's back. Evidently, however, it was neither time a case of casually sprawling over each other like Painted Turtles on a crowded sunning-log. The Box Turtles